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(54) [Title of the Invention] PROCESS DATA INPUT/OUTPUT SYSTEM

(57) [Abstract]

[Purpose] To configure a system that can operate without correcting an application program, irrespective of the structure of an input/output device to be added.

[Construction] A process data input/output system includes a common user interface for transmitting a connection request, a data input/output request report, and a disconnection request in accordance with an instruction given by an application program; and a server process being activated by the connection request, the server process exchanging data with an input/output device in accordance with a data input/output request, transmitting the result to the common user interface, and giving a disconnection

response in response to the disconnection request.

[Effects] The reliability of the system is enhanced without changing the application program.

[Claim]

[Claim 1] A process data input/output system for exchanging data between at least one input/output device located at a process side and at least one application program installed at a client side, the system comprising a common user interface for transmitting a connection request, a data input/output request report, and a disconnection request in accordance with an instruction given by the application program; and a server process being activated by the connection request, the server process exchanging data with the input/output device in accordance with the data input/output request, transmitting the result to the common user interface, and giving a disconnection response in response to the disconnection request.

[Detailed Description of the Invention]

[0001]

[Industrial Field of the Invention] The present invention relates to a process data input/output system, which is based on a client/server model, for supporting data exchange between an input/output device that transmits and receives data to and from various processes and an application program arbitrarily set by a user, and more particularly relates to a process data input/output system capable of operating without correcting an application program, irrespective of the type of input/output device.

[0002]

[Description of the Related Arts] Fig. 4 shows the concept of the structure of a general process data input/output system. The example shown in Fig. 4 is based on the assumption that this system is a process data input/output system based on a client/server model in which plural computers are connected to a network cable, and an input/output device that actually exchanges data with a process is connected to a server. Specifically, data exchange between an input/output device I/O1 and an application program AP1 set by a user is interfaced by an input/output processing program P1. This input/output processing program P1 is a unique processing program that has a one-to-one correspondence with the input/output device I/O1. The input/output processing program P1 implements data exchange between the input/output device I/O1 and the application programs AP1 and AP2.

[0003]

[Problems to be Solved by the Invention] To add an additional input/output device I/O2 to such a process data input/output system and to implement data exchange between this input/output device I/O2 and the application program AP2, this system must be provided with an input/output processing program P2 that has a one-to-one correspondence with the input/output device I/O2, and, as a result, the details of the application program AP2 must be changed drastically. Since the application program AP2 has different methods for accessing the input/output device I/O2 and the input/output device I/O1, the corresponding portions of the application program AP2 must be corrected in accordance with the method for accessing the input/output device I/O2. This correction is complicated, and maintenance of the system is far from simple.

[0004] In order to solve the foregoing problems, it is an object of the present invention to configure a system capable of operating without correcting an application program, irrespective of the type and structure of input/output device to be added.

[0005]

[Means for Solving the Problems] In order to achieve the foregoing objects, the present invention provides a process data input/output system for exchanging data between at least one input/output device located at a process side and at least one application program installed at a client side, the system comprising a common user interface for transmitting a connection request, a data input/output request report, and a disconnection request in accordance with an instruction given by the application program; and a server process being activated by the connection request, the server process exchanging data with the input/output device in accordance with the data input/output request, transmitting the result to the common user interface, and giving a disconnection response in response to the disconnection request.

[0006]

[Operation] In a process data input/output system of the present invention, a unified user interface issues a connection request to a server process supporting an input/output device in accordance with an instruction given by an application program installed at a client side. In other words, data is exchanged by communicating a connection response, a data input/output request report, data transmission, a disconnection request, and a disconnection response.

[0007]

[Embodiments] The present invention will now be described in detail with reference to the drawings. Fig. 3 is a diagram describing the principle of a process data input/output system of the present invention. Referring to Fig. 3, input/output devices I/O1 and I/O2 and application programs AP1 and AP2 are the same as those known devices and programs shown in Fig. 4. According to the present invention, the system is based on a client/server model. The input/output devices I/O1 and I/O2 and the application programs AP1 and AP2 are interconnected by a server, that is, server processes SP11, SP12, and SP2, and a common user interface U I/F. This common user interface U I/F is located at a client side. The common user interface U I/F is a block that interconnects the application programs and the server processes. The common user interface U I/F is a unified block, irrespective of the type of application programs and server processes.

[0008] Specifically, the application program AP1 is connected to the input/output devices I/O1 via the common user interface U I/F and the server process SP11. The application program AP2 is connected to the input/output devices I/O1 via the common user interface U I/F and the server process SP12 and is connected to the input/output device I/O2 via the common user interface U I/F and the server process SP2.

[0009] The application programs AP1 and AP2 at the client side are connected to the server by the unified common user interface U I/F. For example, an additional input/output device I/O2, besides the input/output device I/O1, can be added to the system by adding this input/output device I/O2 to the server process SP2 associated with the input/output device I/O2. The details of the application program AP2 need not be corrected.

[0010] Fig. 1 is a conceptual diagram of main portions of the process data input/output system of the present invention. Fig. 1 is a connection diagram of a process input/output cassette PIOC serving as a server and a process input/output adapter PIOA serving as a client. Fig. 1 also shows the details of the connection states of the application program AP, the common user interface U I/F, and the server process SP. The application program AP is connected to the process input/output cassette PIOC via the process input/output adapter PIOA. The process input/output adapter AD interconnects the common user interface U I/F and the server process SP. The actual process input/output adapter AD corresponds to communication means between the common user interface U I/F and the server process SP. The server process SP in the process input/output cassette PIOC actually includes a server program SPa and a server interface SPb.

[0011] The common user interface U I/F is a common interface portion independent of the type of process input/output cassette PIOC serving as the server and the type of input/output device connected thereto via a driver from the process input/output cassette PIOC. The server program SPa is a block that accepts a request given by the application program AP via the common user interface U I/F and that performs general server functions including, for example, an input/output function (read/write control function of controlling reading and writing of process data from/to the input/output device (driver)), an editing function (function of editing the request from the application program AP in accordance with an access method associated with the input/output device (driver)), a line control function (function of monitoring and controlling the state of a communication line), a maintenance function (function of maintaining the overall system and internal information of the process input/output cassette PIOC), an event function (function of receiving an event message from the input/output device (driver), normalizing the received event message, and reporting the normalized event message to the application program AP), and an automatic equalization function (function of reflecting maintenance information of the input/output device (driver) in computing means). The server interface SPb is an interface connecting the foregoing functions to the server program SPa and the input/output device connected to the driver.

[0012] The process input/output cassette PIOC includes the server process SP and is a single software package containing a cassette provided with the foregoing plural functions. In other words, the process input/output cassette PIOC is one set of software blocks and is connected, in terms of software, to the driver of the input/output interface, a simulator, and the like.

[0013] Using the chart of Fig. 2, in the system of the present invention, which is arranged as described above, the communication operation between the process input/output cassette PIOC serving as the server and the process input/output adapter PIOA serving as the client will now be described.

(1) When the application program AP starts operating, and when a data obtaining request or the like is issued, a connection request is transmitted to the process input/output cassette PIOC. In response, the process input/output cassette PIOC is activated.

(2) The process input/output cassette PIOC gives a response indicating that the process input/output cassette PIOC has been activated normally to the application program AP. Accordingly, the application program AP and the process input/output cassette PIOC are interconnected, and the process input/output cassette PIOC is queued for a request from the application program AP.

(3) The application program AP transmits a data input/output request to the process input/output cassette PIOC. Since this request is the data input/output request, not a disconnection request, the process input/output cassette PIOC starts editing data. To input/output data from/to the input/output device via the driver, the process input/output cassette PIOC performs reading/writing operation.

(4) The process input/output cassette PIOC transmits the

reading/writing result to the application program AP.

(5) The application program AP receives this processing result and, at the time the entire processing is terminated, reports a disconnection request to the process input/output cassette PIOC.

(6) Upon reception of the disconnection request, the process input/output cassette PIOC transmits a disconnection response to the application program AP.

[0014] The application program AP and the process input/output cassette PIOC (server process SP) communicate with each other in the foregoing manner. The side that actually exchanges data with the input/output device is the process input/output cassette PIOC. The application program AP is not involved in data exchange with the input/output device. In other words, even when an additional input/output device is added, a server process associated with this input/output device is connected to the application program AP via the common user interface U I/F by providing the process input/output cassette PIOC with this associated server process. The internal structure of the application program AP is not influenced, and the details of the application program AP need not be modified or changed.

[0015]

[Advantages] As described above, according to the present invention, a process data input/output system is clearly based on a client/server model. Interface portions of application programs at a client side are unified as a common user interface, and a server actually accesses an input/output device. Even when an additional input/output device is added to this system, the application program need not be changed or modified. The application program may remain unchanged, and the reliability of the system is enhanced.

[Brief Description of the Drawings]

[Fig. 1] Fig. 1 is a conceptual diagram showing main portions of a process data input/output system of the present invention.

[Fig. 2] Fig. 2 is a chart showing the operation of the system of the present invention, which is shown in Fig. 1.

[Fig. 3] Fig. 3 is a conceptual diagram showing the entire system of the present invention.

[Fig. 4] Fig. 4 is a diagram showing a known process data input/output system.

[Reference Numerals]

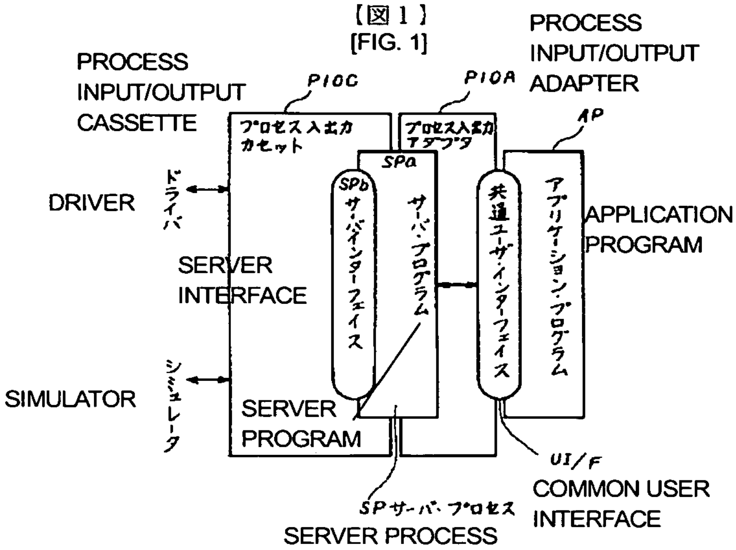
AP, AP1, and AP2: application programs
I/O1 and I/O2: input/output devices
U I/F: common user interface
SP, SP11, SP12, and SP2: server processes
PIOC: process input/output cassette

SPa: server program

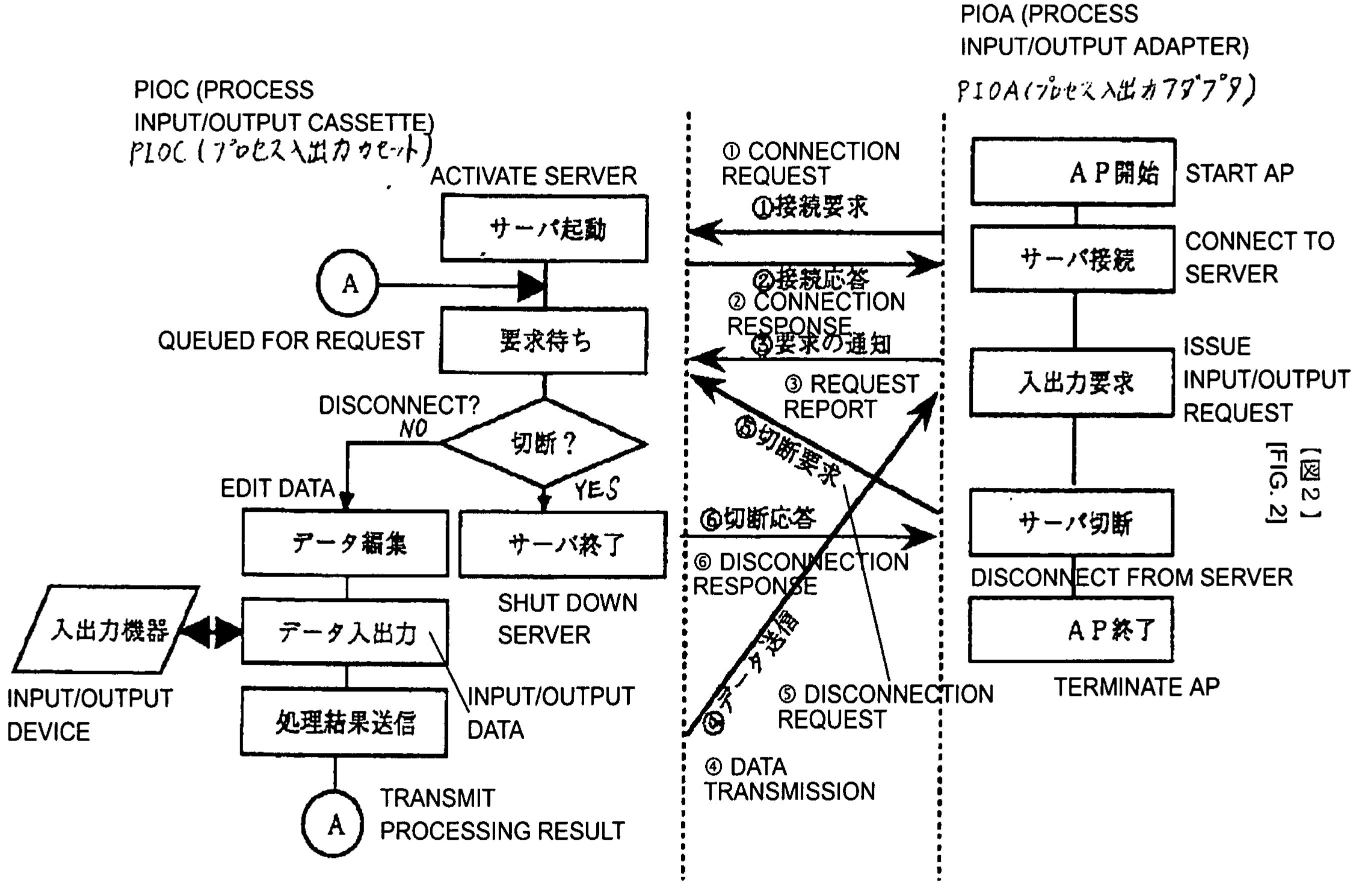
SPb: server interface

PIOA: process input/output adapter

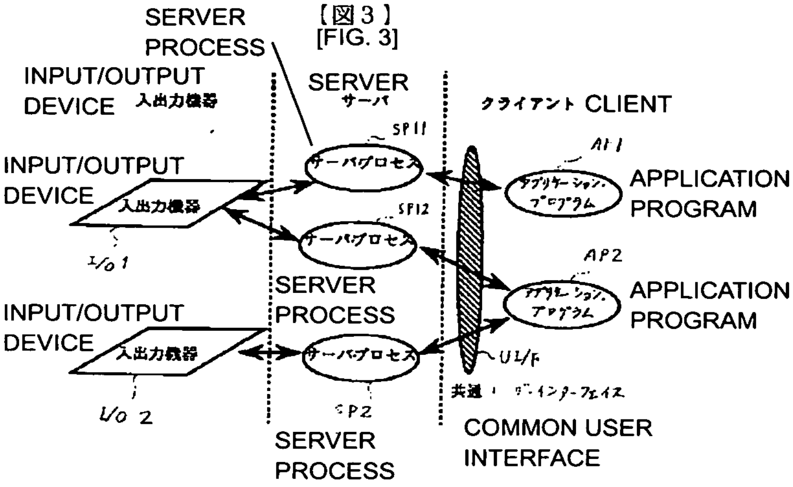
【図１】
[FIG. 1]


PROCESS INPUT/OUTPUT CASSETTE
PIOC
プロセス入出力カセット
PIOA
プロセス入出力アダプタ
PROCESS INPUT/OUTPUT ADAPTER
AP
SPa
SPb
ドライバ
DRIVER
サーバ・インターフェイス
SERVER INTERFACE
サーバ・プログラム
共通ユーザ・インターフェイス
アプリケーション・プログラム
APPLICATION PROGRAM
シミュレータ
SIMULATOR
SERVER PROGRAM
UI/F
COMMON USER INTERFACE
SPサーバ・プロセス
SERVER PROCESS

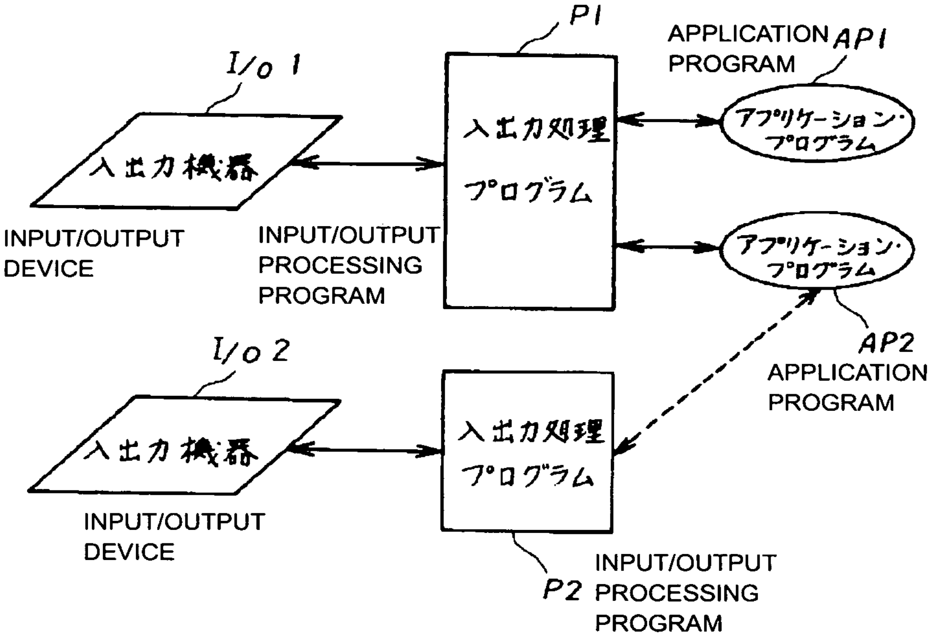
【図２】
[FIG. 2]


PIOC (PROCESS
INPUT/OUTPUT CASSETTE)
PIOC (プロセス入出力カセット)
ACTIVATE SERVER
サーバ起動
A
QUEUED FOR REQUEST
要求待ち
DISCONNECT?
切断？
NO
YES
EDIT DATA
データ編集
サーバ終了
SHUT DOWN
SERVER
入出力機器
INPUT/OUTPUT
DEVICE
データ入出力
INPUT/OUTPUT
DATA
処理結果送信
A
TRANSMIT
PROCESSING RESULT
① CONNECTION
REQUEST
①接続要求
②接続応答
② CONNECTION
RESPONSE
③要求の通知
③ REQUEST
REPORT
⑤切断要求
⑥切断応答
⑥ DISCONNECTION
RESPONSE
④データ送信
⑤ DISCONNECTION
REQUEST
④ DATA
TRANSMISSION
PIOA (PROCESS
INPUT/OUTPUT ADAPTER)
PIOA (プロセス入出力アダプタ)
ＡＰ開始
START AP
サーバ接続
CONNECT TO
SERVER
入出力要求
ISSUE
INPUT/OUTPUT
REQUEST
サーバ切断
DISCONNECT FROM SERVER
ＡＰ終了
TERMINATE AP

【図3】
[FIG. 3]


SERVER PROCESS
INPUT/OUTPUT DEVICE
入出力機器
SERVER
サーバ
クライアント CLIENT
SP11
サーバプロセス
AP1
アプリケーションプログラム
APPLICATION PROGRAM
INPUT/OUTPUT DEVICE
入出力機器
I/O 1
SP12
サーバプロセス
AP2
アプリケーションプログラム
APPLICATION PROGRAM
SERVER PROCESS
INPUT/OUTPUT DEVICE
入出力機器
サーバプロセス
UI/F
I/O 2
SP2
共通ユーザインターフェイス
SERVER PROCESS
COMMON USER INTERFACE

【図4】
[FIG. 4]


P1
APPLICATION PROGRAM
AP1
I/o 1
入出力機器
入出力処理プログラム
アプリケーション・プログラム
INPUT/OUTPUT DEVICE
INPUT/OUTPUT PROCESSING PROGRAM
アプリケーション・プログラム
AP2
APPLICATION PROGRAM
I/o 2
入出力機器
入出力処理プログラム
INPUT/OUTPUT DEVICE
P2
INPUT/OUTPUT PROCESSING PROGRAM